



# SEQUENCE LISTING

<110> GROZINGER, CHRISTINA M.  
HASSIG, CHRISTIAN A.  
SCHREIBER, STUART L.

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Glu	Gly	Asp	Gly	Ser	Pro	His	Gly	His	Ala	Ser	Leu	Leu	Gln	His	Val	435	440	445
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Leu	His	Gly	Gln	Ser	Pro	Leu	Val	Thr	Gly	Glu	Arg	Val	Ala	Thr	Ser	465	470	475
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Met	Arg	Thr	Val	Gly	Lys	Leu	Pro	Arg	His	Arg	Pro	Leu	Ser	Arg	Thr	485	490	495
Gln	Ser	Ser	Pro	Leu	Pro	Gln	Ser	Pro	Gln	Ala	Leu	Gln	Gln	Leu	Val	500	505	510
Met	Gln	Gln	Gln	His	Gln	Gln	Phe	Leu	Glu	Lys	Gln	Lys	Gln	Gln	Gln	515	520	525
Leu	Gln	Leu	Gly	Lys	Ile	Leu	Thr	Lys	Thr	Gly	Glu	Leu	Pro	Arg	Gln	530	535	540
Pro	Thr	Thr	His	Pro	Glu	Glu	Thr	Glu	Glu	Glu	Leu	Thr	Glu	Gln	Gln	545	550	555
Glu	Val	Leu	Leu	Gly	Glu	Gly	Ala	Leu	Thr	Met	Pro	Arg	Glu	Gly	Ser	565	570	575
Thr	Glu	Ser	Glu	Ser	Thr	Gln	Glu	Asp	Leu	Glu	Glu	Glu	Asp	Glu	Glu	580	585	590
Glu	Asp	Gly	Glu	Glu	Glu	Glu	Asp	Cys	Ile	Gln	Val	Lys	Asp	Glu	Glu	595	600	605
Gly	Glu	Ser	Gly	Ala	Glu	Glu	Gly	Pro	Asp	Leu	Glu	Glu	Pro	Gly	Ala	610	615	620
Gly	Tyr	Lys	Lys	Leu	Phe	Ser	Asp	Ala	Gln	Pro	Leu	Gln	Pro	Leu	Gln	625	630	635
Val	Tyr	Gln	Ala	Pro	Leu	Ser	Leu	Ala	Thr	Val	Pro	His	Gln	Ala	Leu	645	650	655
Gly	Arg	Thr	Gln	Ser	Ser	Pro	Ala	Ala	Pro	Gly	Gly	Met	Lys	Ser	Pro	660	665	670
Pro	Asp	Gln	Pro	Val	Lys	His	Leu	Phe	Thr	Thr	Gly	Val	Val	Tyr	Asp	675	680	685
Thr	Phe	Met	Leu	Lys	His	Gln	Cys	Met	Cys	Gly	Asn	Thr	His	Val	His	690	695	700
Pro	Glu	His	Ala	Gly	Arg	Ile	Gln	Ser	Ile	Trp	Ser	Arg	Leu	Gln	Glu	705	710	715
Thr	Gly	Leu	Leu	Ser	Lys	Cys	Glu	Arg	Ile	Arg	Gly	Arg	Lys	Ala	Thr	725	730	735
Leu	Asp	Glu	Ile	Gln	Thr	Val	His	Ser	Glu	Tyr	His	Thr	Leu	Leu	Tyr	740	745	750
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Gly	Val	Asp	Ser	Asp	Thr	Val	Trp	Asn	Glu	Met	His	Ser	Ser	Ser	Ala	785	790	795	800
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His	Ala	Glu	Glu	Ser	Thr	Ala	Met	Gly	Phe	Cys	Phe	Phe	Asn	Ser	Val	835	840	845	
Ala	Ile	Thr	Ala	Lys	Leu	Leu	Gln	Gln	Lys	Leu	Asn	Val	Gly	Lys	Val	850	855	860	
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Phe	Tyr	Asn	Asp	Pro	Ser	Val	Leu	Tyr	Ile	Ser	Leu	His	Arg	Tyr	Asp	885	890	895	
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Thr	Ala	Ile	Cys	Asp	Ala	Ser	Glu	Ala	Cys	Val	Ser	Ala	Leu	Leu	Ser	1010	1015	1020	
Val	Glu	Leu	Gln	Pro	Leu	Asp	Glu	Ala	Val	Leu	Gln	Gln	Lys	Pro	Asn	1025	1030	1035	1040
Ile	Asn	Ala	Val	Ala	Thr	Leu	Glu	Lys	Val	Ile	Glu	Ile	Gln	Ser	Lys	1045	1050	1055	
His	Trp	Ser	Cys	Val	Gln	Lys	Phe	Ala	Ala	Gly	Leu	Gly	Arg	Ser	Leu	1060	1065	1070	
Arg	Glu	Ala	Gln	Ala	Gly	Glu	Thr	Glu	Glu	Ala	Glu	Thr	Val	Ser	Ala	1075	1080	1085	

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      35                40                45

Glu Val Lys Lys Lys Gly Lys Met Lys Lys Leu Gly Gln Ala Met Glu
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Glu Asp Leu Ile Val Gly Leu Gln Gly Met Asp Leu Asn Leu Glu Ala
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Glu Ala Leu Ala Gly Thr Gly Leu Val Leu Asp Glu Gln Leu Asn Glu
      85                90                95

Phe His Cys Leu Trp Asp Asp Ser Phe Pro Glu Gly Pro Glu Arg Leu
      100                105                110

His Ala Ile Lys Glu Gln Leu Ile Gln Glu Gly Leu Leu Asp Arg Cys
      115                120                125

Val Ser Phe Gln Ala Arg Phe Ala Glu Lys Glu Glu Leu Met Leu Val
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His Ser Leu Glu Tyr Ile Asp Leu Met Glu Thr Thr Gln Tyr Met Asn
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Arg	Leu	Val	Asp	Ala	Val	Leu	Gly	Ala	Glu	Ile	Arg	Asn	Gly	Met	Ala	195	200	205
Ile	Ile	Arg	Pro	Pro	Gly	His	His	Ala	Gln	His	Ser	Leu	Met	Asp	Gly	210	215	220
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Phe	Ser	Ile	His	Arg	Tyr	Glu	Gln	Gly	Arg	Phe	Trp	Pro	His	Leu	Lys	275	280	285
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Ala	Ala	Phe	Leu	His	Val	Leu	Leu	Pro	Val	Ala	Leu	Glu	Phe	Gln	Pro	325	330	335
Gln	Leu	Val	Leu	Val	Ala	Ala	Gly	Phe	Asp	Ala	Leu	Gln	Gly	Asp	Pro	340	345	350
Lys	Gly	Glu	Met	Ala	Ala	Thr	Pro	Ala	Gly	Phe	Ala	Gln	Leu	Thr	His	355	360	365
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Pro	Phe	Trp	Glu	Val	Leu	Val	Arg	Ser	Thr	Glu	Thr	Val	Glu	Arg	Asp	435	440	445
Asn	Met	Glu	Glu	Asp	Asn	Val	Glu	Glu	Ser	Glu	Glu	Glu	Gly	Pro	Trp	450	455	460

Glu	Pro	Pro	Val	Leu	Pro	Ile	Leu	Thr	Trp	Pro	Val	Leu	Gln	Ser	Arg	465	470	475	480
Thr	Gly	Leu	Val	Tyr	Asp	Gln	Asn	Met	Met	Asn	His	Cys	Asn	Leu	Trp	485	490		495
Asp	Ser	His	His	Pro	Glu	Val	Pro	Gln	Arg	Ile	Leu	Arg	Ile	Met	Cys	500	505		510
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Arg	Pro	Ala	Thr	Glu	Ala	Glu	Leu	Leu	Thr	Cys	His	Ser	Ala	Glu	Tyr	530	535		540
Val	Gly	His	Leu	Arg	Ala	Thr	Glu	Lys	Met	Lys	Thr	Arg	Glu	Leu	His	545	550		555
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Ala	Cys	Ala	Gln	Leu	Ala	Thr	Gly	Ala	Ala	Cys	Arg	Leu	Val	Glu	Ala	580	585		590
Val	Leu	Ser	Gly	Glu	Val	Leu	Asn	Gly	Ala	Ala	Val	Val	Arg	Pro	Pro	595	600		605
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Ser	Val	Ala	Val	Ala	Ala	Arg	His	Ala	Gln	Thr	Ile	Ser	Gly	His	Ala	625	630		635
Leu	Arg	Ile	Leu	Ile	Val	Asp	Trp	Asp	Val	His	His	Gly	Asn	Gly	Thr	645	650		655
Gln	His	Met	Phe	Glu	Asp	Asp	Pro	Ser	Val	Leu	Tyr	Val	Ser	Leu	His	660	665		670
Arg	Tyr	Asp	His	Gly	Thr	Phe	Phe	Pro	Met	Gly	Asp	Glu	Gly	Ala	Ser	675	680		685
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Val	Ser	Ala	Gly	Phe	Asp	Ala	Ala	Arg	Gly	Asp	Pro	Leu	Gly	Gly	Cys	740	745		750
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<211> 73  
<212> PRT  
<213> Homo sapiens

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Ile Leu Ile Val Asp Trp Asp Val His His Gly Asn Gly Thr Gln Gln  
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Ala Phe Tyr Ser Asp Pro Ser Val Leu Tyr Met Ser Leu His Arg Tyr  
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Asp Asp Gly Asn Phe Phe Pro Gly Ser  
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<210> 12  
 <211> 912  
 <212> PRT  
 <213> Homo sapiens

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Pro Thr Leu Leu Ala Leu Gln Arg Pro Gln Arg Leu His His His Leu
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Phe Leu Ala Gly Leu Gln Gln Gln Arg Ser Val Glu Pro Met Arg Leu
      35             40             45

Ser Met Asp Thr Pro Met Pro Glu Leu Gln Val Gly Pro Gln Glu Gln
      50             55             60

Glu Leu Arg Gln Leu Leu His Lys Asp Lys Ser Lys Arg Ser Ala Val

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Gln	Gln	Ala	Ala	Leu	Glu	Arg	Thr	Val	His	Pro	Asn	Ser	Pro	Gly	Ile	
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Pro	Tyr	Arg	Thr	Leu	Glu	Pro	Leu	Glu	Thr	Glu	Gly	Ala	Thr	Arg	Ser	
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Met	Leu	Ser	Ser	Phe	Leu	Pro	Pro	Val	Pro	Ser	Leu	Pro	Ser	Asp	Pro	
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Pro	Glu	His	Phe	Pro	Leu	Arg	Lys	Thr	Val	Ser	Glu	Pro	Asn	Leu	Lys	
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Thr	Leu	Gly	Asp	Ser	Ser	Pro	Ser	Ser	Ser	Ser	Thr	Pro	Ala	Ser	Gly	
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Cys	Ser	Ser	Pro	Asn	Asp	Ser	Glu	His	Gly	Pro	Asn	Pro	Ile	Leu	Gly	
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Pro	Leu	Pro	Phe	His	Phe	Ala	Gln	Ser	Leu	Met	Thr	Thr	Glu	Arg	Leu	
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Ser	Gly	Ser	Gly	Leu	His	Trp	Pro	Leu	Ser	Arg	Thr	Arg	Ser	Glu	Pro	
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Leu	Pro	Pro	Ser	Ala	Thr	Ala	Pro	Pro	Pro	Pro	Gly	Pro	Met	Gln	Pro	
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Arg	Leu	Glu	Gln	Leu	Lys	Thr	His	Val	Gln	Val	Ile	Lys	Arg	Ser	Ala	
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Lys	Pro	Ser	Glu	Lys	Pro	Arg	Leu	Arg	Gln	Ile	Pro	Ser	Ala	Glu	Asp	
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Leu	Glu	Thr	Asp	Gly	Gly	Gly	Pro	Gly	Gln	Val	Val	Asp	Asp	Gly	Leu	

370	375	380
Glu His Arg Glu Leu Gly His Gly Gln Pro Glu Ala Arg Gly Pro Ala 385 390 395 400		
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Ala Gly Arg Leu Pro Arg Gly Ser Thr Gly Asp Thr Val Leu Leu Pro 420 425 430		
Leu Ala Gln Gly Gly His Arg Pro Leu Ser Arg Ala Gln Ser Ser Pro 435 440 445		
Ala Ala Pro Ala Ser Leu Ser Ala Pro Glu Pro Ala Ser Gln Ala Arg 450 455 460		
Val Leu Ser Ser Ser Glu Thr Pro Ala Arg Thr Leu Pro Phe Thr Thr 465 470 475 480		
Gly Leu Ile Tyr Asp Ser Val Met Leu Lys His Gln Cys Ser Cys Gly 485 490 495		
Asp Asn Ser Arg His Pro Glu His Ala Gly Arg Ile Gln Ser Ile Trp 500 505 510		
Ser Arg Leu Gln Glu Arg Gly Leu Arg Ser Gln Cys Glu Cys Leu Arg 515 520 525		
Gly Arg Lys Ala Ser Leu Glu Glu Leu Gln Ser Val His Ser Glu Arg 530 535 540		
His Val Leu Leu Tyr Gly Thr Asn Pro Leu Ser Arg Leu Lys Leu Asp 545 550 555 560		
Asn Gly Lys Leu Ala Gly Leu Leu Ala Gln Arg Met Phe Val Met Leu 565 570 575		
Pro Cys Gly Gly Val Gly Val Asp Thr Asp Thr Ile Trp Asn Glu Leu 580 585 590		
His Ser Ser Asn Ala Ala Arg Trp Ala Ala Gly Ser Val Thr Asp Leu 595 600 605		
Ala Phe Lys Val Ala Ser Arg Glu Leu Lys Asn Gly Phe Ala Val Val 610 615 620		
Arg Pro Pro Gly His His Ala Asp His Ser Thr Ala Met Gly Phe Cys 625 630 635 640		
Phe Phe Asn Ser Val Ala Ile Ala Cys Arg Gln Leu Gln Gln Gln Ser 645 650 655		
Lys Ala Ser Lys Ile Leu Ile Val Asp Trp Asp Val His His Gly Asn 660 665 670		
Gly Thr Gln Gln Thr Phe Tyr Gln Asp Pro Ser Val Leu Tyr Ile Ser		

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Lys	Gln	Lys	Pro	Asn	Leu	Asn	Ala	Ile	Arg	Ser	Leu	Glu	Ala	Val	Ile
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Arg	Val	His	Ser	Lys	Tyr	Trp	Gly	Cys	Met	Gln	Arg	Leu	Ala	Ser	Cys
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Pro	Asp	Ser	Trp	Val	Pro	Arg	Val	Pro	Gly	Ala	Asp	Lys	Glu	Glu	Val
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Glu	Ala	Val	Thr	Ala	Leu	Ala	Ser	Leu	Ser	Val	Gly	Ile	Leu	Ala	Glu
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Met Met Pro Val Val Asp Pro Val Val Arg Glu Lys Gln Leu Gln Gln
      35              40              45

Glu Leu Leu Leu Ile Gln Gln Gln Gln Gln Ile Gln Lys Gln Leu Leu
  50              55              60

Ile Ala Glu Phe Gln Lys Gln His Glu Asn Leu Thr Arg Gln His Gln
  65              70              75              80

Ala Gln Leu Gln Glu His Ile Lys Glu Leu Leu Ala Ile Lys Gln Gln
      85              90              95

Gln Glu Leu Leu Glu Lys Glu Gln Lys Leu Glu Gln Gln Arg Gln Glu
 100              105              110

Gln Glu Val Glu Arg His Arg Arg Glu Gln Gln Leu Pro Pro Leu Arg
 115              120              125

Gly Lys Asp Arg Gly Arg Glu Arg Ala Val Ala Ser Thr Glu Val Lys
 130              135              140

Gln Lys Leu Gln Glu Phe Leu Leu Ser Lys Ser Ala Thr Lys Asp Thr
 145              150              155              160

Pro Thr Asn Gly Lys Asn His Ser Val Ser Arg His Pro Lys Leu Trp
      165              170              175

Tyr Thr Ala Ala His His Thr Ser Leu Asp Gln Ser Ser Pro Pro Leu
      180              185              190

Ser Gly Thr Ser Pro Ser Tyr Lys Tyr Thr Leu Pro Gly Ala Gln Asp
 195              200              205

Ala Lys Asp Asp Phe Pro Leu Arg Lys Thr Ala Ser Glu Pro Asn Leu
 210              215              220

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Lys	Val	Arg	Ser	Arg	Leu	Lys	Gln	Lys	Val	Ala	Glu	Arg	Arg	Ser	Ser	225	230	235	240
Pro	Leu	Leu	Arg	Arg	Lys	Asp	Gly	Asn	Val	Val	Thr	Ser	Phe	Lys	Lys	245	250	255	
Arg	Met	Phe	Glu	Val	Thr	Glu	Ser	Ser	Val	Ser	Ser	Ser	Ser	Pro	Gly	260	265	270	
Ser	Gly	Pro	Ser	Ser	Pro	Asn	Asn	Gly	Pro	Thr	Gly	Ser	Val	Thr	Glu	275	280	285	
Asn	Glu	Thr	Ser	Val	Leu	Pro	Pro	Thr	Pro	His	Ala	Glu	Gln	Met	Val	290	295	300	
Ser	Gln	Gln	Arg	Ile	Leu	Ile	His	Glu	Asp	Ser	Met	Asn	Leu	Leu	Ser	305	310	315	320
Leu	Tyr	Thr	Ser	Pro	Ser	Leu	Pro	Asn	Ile	Thr	Leu	Gly	Leu	Pro	Ala	325	330	335	
Val	Pro	Ser	Gln	Leu	Asn	Ala	Ser	Asn	Ser	Leu	Lys	Glu	Lys	Gln	Lys	340	345	350	
Cys	Glu	Thr	Gln	Thr	Leu	Arg	Gln	Gly	Val	Pro	Leu	Pro	Gly	Gln	Tyr	355	360	365	
Gly	Gly	Ser	Ile	Pro	Ala	Ser	Ser	Ser	His	Pro	His	Val	Thr	Leu	Glu	370	375	380	
Gly	Lys	Pro	Pro	Asn	Ser	Ser	His	Gln	Ala	Leu	Leu	Gln	His	Leu	Leu	385	390	395	400
Leu	Lys	Glu	Gln	Met	Arg	Gln	Gln	Lys	Leu	Leu	Val	Ala	Gly	Gly	Val	405	410	415	
Pro	Leu	His	Pro	Gln	Ser	Pro	Leu	Ala	Thr	Lys	Glu	Arg	Ile	Ser	Pro	420	425	430	
Gly	Ile	Arg	Gly	Thr	His	Lys	Leu	Pro	Arg	His	Arg	Pro	Leu	Asn	Arg	435	440	445	
Thr	Gln	Ser	Ala	Pro	Leu	Pro	Gln	Ser	Thr	Leu	Ala	Gln	Leu	Val	Ile	450	455	460	
Gln	Gln	Gln	His	Gln	Gln	Phe	Leu	Glu	Lys	Gln	Lys	Gln	Tyr	Gln	Gln	465	470	475	480
Gln	Ile	His	Met	Asn	Lys	Leu	Leu	Ser	Lys	Ser	Ile	Glu	Gln	Leu	Lys	485	490	495	
Gln	Pro	Gly	Ser	His	Leu	Glu	Glu	Ala	Glu	Glu	Glu	Leu	Gln	Gly	Asp	500	505	510	
Gln	Ala	Met	Gln	Glu	Asp	Arg	Ala	Pro	Ser	Ser	Gly	Asn	Ser	Thr	Arg	515	520	525	

Ser Asp Ser Ser Ala Cys Val Asp Asp Thr Leu Gly Gln Val Gly Ala  
530 535 540

Val Lys Val Lys Glu Glu Pro Val Asp Ser Asp Glu Asp Ala Gln Ile  
545 550 555 560

Gln Glu Met Glu Ser Gly Glu Gln Ala Ala Phe Met Gln Gln Val Ile  
565 570 575

Gly Lys Asp Leu Ala Pro Gly Phe Val Ile Lys Val Ile Ile  
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<400> 15

His His Ala Lys Lys Ser Glu Ala Ser Gly Phe Cys Tyr Val Asn Asp  
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Tyr Ile Asp Ile Asp Ile His His Gly Asp Gly Val Glu Glu Ala Phe  
35 40 45

Tyr Thr Thr Asp Arg Val Met Thr Val Ser Phe His Lys Tyr Gly Glu  
50 55 60

Tyr Phe Pro Gly Thr  
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<210> 16

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<212> PRT

<213> Saccharomyces sp.

<400> 16

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Val Ala Val Ala Ala Lys Asn Ile Leu Lys Asn Tyr Pro Glu Ser Val  
20 25 30

Arg Arg Ile Met Ile Leu Asp Trp Asp Ile His His Gly Asn Gly Thr  
35 40 45

Gln Lys Ser Phe Tyr Gln Asp Asp Gln Val Leu Tyr Val Ser Leu His  
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<210> 27

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Gly Glu Asp Cys Pro

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<210> 32

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<400> 38  
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Tyr Val Asp Leu Asp Leu His His Gly Asp  
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Ile Val Asp Trp Asp Val His His Gly Gln  
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Ser Val Ala Val Ala Arg His Ala Gln Thr Ile Ser Gly His Ala  
20 25 30

Leu Arg Ile Leu Ile Val Asp Trp Asp Val His His Gly Asn Gly Thr  
35 40 45

Gln His Met Phe Glu Asp Asp Pro Ser Val Leu Tyr Val Ser Leu His  
50 55 60

Arg Tyr Asp His Gly Thr Phe Phe Pro Met Gly  
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<223> Cys or Thr

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<223> Val or Ile



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<222> (4)..(5)

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Gly Xaa Cys Xaa Xaa Asn  
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Xaa Glu Gly Gly Xaa  
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